

GPO's Lab Offers A Wide Range of Testing and Technical Services

According to the 1922 *Annual Report of the Public Printer*, a testing section was established in the GPO on February 1, 1922. This section was equipped with the best and latest devices available at the time for the testing of paper and other materials used in the production of printing and binding. Since that time, this testing section expanded into the GPO's Testing and Technical Services Branch (T&TSB) laboratory. The T&TSB laboratory currently includes seven laboratories that offer a wide range of testing and technical services to meet both agency and customer needs.

"For me, the lab is an opportunity to explore," says Tyler Wood, who serves as an Assistant Manager of the Quality Control and Inventory Management Department (QCIMD). "Over the years, the lab has gone through improvements and innovations. Since 2010, the lab has experienced an expansion in technical capabilities in

response to the increased sophistication of customer materials and products. These improvements and innovations resulted in a seemingly endless opportunity to explore new materials and identify ways to ensure consistency and quality in customers' products."

The Lab: Then and Now

In 1926, Congress approved funding for the construction of Building 2 (currently Building B) for the GPO. The building was intended to house several areas, including a new testing laboratory with the intent of evaluating paper, inks and type metal to achieve savings in material costs. The B building was completed in 1930, and the new laboratory showed immediate success in creating cost savings for agency customers. The laboratory has not wavered from its original purpose, expanding to meet the needs of agency customers as they require higher quality



Pictured from left to right: Michael Mooney, Tyler Wood, Yolonda Sales, Lowell Brown, Michelle Sullivan, William Pinson, and David Fabio. This picture shows the first time since March 2020 that the entire team was able to come together in one physical location. The team truly appreciated the gravity of the occasion.

materials.

In 2020, the mission of the T&TSB laboratory expanded to: *"Enable the achievement of GPO's mission of Keeping America Informed by providing high quality laboratory services through the use of strategic partnerships, expanding test capabilities, and technical leadership in the areas of raw material analysis, finished product testing, investigative solutions, and process optimization."*

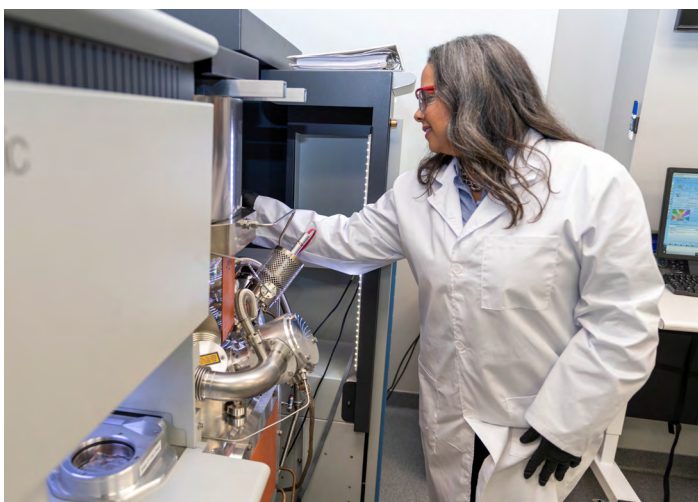
The T&TSB laboratory is in the location first proposed in 1926, on the fifth floor of the B building, in Washington D.C., and has been operating continuously for over 90 years. The T&TSB laboratory is in the Plant Operations business unit, and within QCIMD. The current team is comprised of: Lowell Brown (Senior Engineer), David Fabio (Physical Science Technician), Tisha Jenkins (Secretary), Michael Mooney (Manager), William (Glenn) Pinson, Ph.D. (Senior Chemist),

Yolonda Sales, Ph.D. (Senior Chemist), Michelle Sullivan, Ph.D. (Senior Chemist), and Tyler Wood (Assistant Manager). "The lab team is a diverse group of individuals with different technical backgrounds and experiences. Over the last several years, we have worked together as a team to address technical challenges for the betterment of the agency, our customers and our partners," says Wood. "I am grateful and privileged to have such a talented team and I am proud of the work we do."

The laboratory's technical and analytical capabilities continue to expand to meet the demand of the agency and customer needs. In the laboratory's current state, there are seven separate laboratories. Each of these seven laboratories are devoted to different kinds of testing including: paper, non-paper materials, Scanning Electron Microscopy (SEM), X-Ray Photoelectron



Chemists working in the GPO laboratory during the 1930's.



Senior Chemist Michelle Sullivan exhibits the X-Ray Photoelectron Spectrometry (XPS) Near Surface Analysis instrument.

Spectrometry (XPS), wet chemistry, and secure document materials. The T&TSB has separate testing protocols and laboratories for secure and non-secure materials. Within these seven laboratories, reside 90 different instruments capable of performing a range of analytical tests and evaluations. Lab personnel are cross-trained on these different pieces of equipment; however, each team member is considered a Subject Matter Expert (SME) on specific instruments and test methods. The lab has an efficient and documented preventative maintenance and calibration program in place to ensure that all instruments are working properly, and deliver quality data that customers can trust. Throughout the laboratory's nearly 100 years, consistent contributions towards the achievement of the GPO's mission were made by providing a diverse range of technical services to the agency.

T&TSB Projects: Meeting Agency and Customer Needs

Currently, the laboratory is working on multiple projects to meet agency and customer needs. One of these projects is an ongoing proprietary adhesive testing program, which is led by Yolonda Sales. This monthly testing program is a critical part of the regular production of high-quality e-passports, by ensuring that the adhesives used meet the State Department's quality guidelines. Sales is currently conducting research to expand and increase the efficiency of the lab's adhesive and ink testing capabilities by leveraging recently purchased Rheology equipment. "The purchase of our new Rheology equipment was a real game-changer for our laboratory," says Sales. "The Rheology research that we have conducted over the past year has given us great insight into important material properties such as flow, deformation,



Senior Chemist Yolonda Sales explains the process of testing viscosities of adhesives with the lab's Modular Compact Rheometer.



Physical Science Technician David Fabio explains the process of testing viscosities of adhesives with the lab's Fungilab viscometer.

and viscosity. These technical insights empower us to successfully collaborate with our stakeholders in making the best decisions regarding material characterization, quality specifications, and product performance. These informed decisions are a critical part of the successful production of various GPO products."

Development work is also being performed to evaluate surface chemistry to ensure that the materials used for the Next Generation Passport

(NGP) are free of any surface contaminants and will adhere properly during the manufacturing process. This surface analysis work is led by Glenn Pinson and Michelle Sullivan using innovative goniometry/contact angle testing along with a state-of-the-art, million-dollar XPS instrument. "The XPS allows us to test the surface chemistry of materials with unparalleled throughput that matches GPO's production rates," says Sullivan. "The

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surface chemistry of materials determines whether they will adhere together, and successful adhesion directly affects the quality and security of a finished document. This is especially important in secure documents such as the US Passport, and the driving reason why surfaces are evaluated prior to their introduction into high value-added production processes.” Sullivan is also using this XPS instrumentation to develop novel document security analysis methodologies. This work is currently being compiled for publication in a major scientific journal. Another high value piece of lab equipment is the million-dollar SEM instrument used in research that is led by Pinson, to solve manufacturing challenges related to various raw materials and processes.

Paper testing is another area in which the T&TSB lab contributes to the agency in a crucial way. The lab serves its Customer Service and Plant Operations partners by performing a rigorous set of testing on the various paper products that the GPO receives for product

manufacturing. Some of the paper testing that the lab regularly completes includes: roughness, gloss, opacity, strength testing, color, and other methods that are specified by Congress’ Joint Committee on Printing (JCP), Government Paper Specifications and Standards (GPSS), with all team members participating in the paper testing.

In addition to solving various chemistry-related issues, the T&TSB lab also has expertise in delivering process-related solutions. In support of Plant Operations’ system modernization strategy, Supply Chain Management (SCM) Division procured and implemented a paperless warehouse management system (WMS) using handheld scanners to receive, store and issue paper stock to all internal customers. This project is being led by Lowell Brown. This modern WMS eliminates data entry errors of the paper-driven system and provides real-time inventory accuracy. SCM intends to expand this warehouse management system to its Production



Senior Engineer Lowell Brown explains the Vertical Thermal Shock climate control chamber.

Materials section in the future.

Other projects outside of the lab that T&TSB team members led and/or contributed to include: NASPO/ANSI Security Assurance and ISO 14298 certifications as well as Sustainable Green Printing certification of the Press Division (Lowell Brown), solvent recycling system improvements (Michelle Sullivan), Bill End optimization strategies (Yolonda Sales) and ISO/ANSI standards development work (Tyler Wood).

Both Michael Mooney and Tyler Wood have demonstrated leadership in the areas of charting a vision for the lab, acquiring the necessary funding for lab instrumentation and renovations, and building a staff of scientists, engineers, and technicians. Although Wood is a manager now, he is still a chemist at heart, often making time to help out with time-sensitive testing. Wood also participates in many agency-critical multi-functional projects with key stakeholders from SID and the Department of State.

Rufaro “Tisha” Jenkins keeps everything on track. Her administration keeps the lab functioning, well supplied, and well organized. Tisha’s contributions play an important role in the overall success of the T&TSB lab.

As the agency customers require higher quality materials, the lab has also added two Physical Science Technicians to the team to provide analytical support of customer requirements and analysis. The team recently welcomed the first of these Physical Science Technicians, David Fabio. David is currently being trained on a variety of testing methods and techniques. He is very excited about his bright future here at the GPO.

Telework

A large part of the T&TSB team’s functions is ‘hands-on’, as team members use chemicals and instruments as a regular part of their job. However, when the COVID-19 pandemic hit last year, the T&TSB developed an effective telework strategy. This 50% telework strategy involved dividing staff into two



Senior Chemist William Pinson explains the capabilities of the lab’s Scanning Electron Microscope and Auxiliary Detectors used for microstructure characterization.

different teams. Each team took turns rotating between telework weeks and in-office weeks. This weekly rotation ensured that agency-critical lab functions were still being completed in a way that was safe for all lab personnel. This strategy ensured compliance with the GPOSAFE COVID-19 response, while maintaining lab productivity and eliminating the need for Weather & Safety Leave.

During their designated telework weeks, T&TSB lab members authored technical reports and summaries of the experiments that they completed while on site the previous week. They attended various virtual trainings and technical seminars, managed lab inventories, and participated in weekly Microsoft (MS) Teams meetings in which they presented experimental findings and project updates. One of the most significant projects that the team has collaborated on over the past year is the “Herculean Project”, a phrase coined by Tyler Wood.

The “Herculean Project” certainly lives up to its name. This project supports achievement of the laboratory’s ISO 17025 accreditation goal. *“ISO/IEC 17025 enables laboratories to demonstrate that they operate competently and generate valid results, thereby promoting confidence in their work both nationally and around the world.”* (ISO.org). Although the T&TSB lab already has a strong reputation for the generation of valid and high-quality lab results, the ISO 17025 accreditation will further

strengthen the lab’s technical credibility. The “Herculean Project” seeks to obtain ISO 17025 accreditation by reorganizing the laboratory’s documentation structure into key pillars. These key pillars include: safety, security, lab instrumentation, lab methods, lab training and qualification. Implementation of a robust documentation system for these critical areas will further enable achievement of the lab’s ISO 17025 goal.

The strategy behind the “Herculean Project” is to transform the laboratory’s quality management system documentation from paper-based to electronic-based, which makes it a perfect fit for telework. This work leverages the use of MS 365, a resource available to all GPO teammates. The bulk of the project integrates MS SharePoint for streamlined document management and record keeping, and MS Power Automate for automating document-related repetitive processes such as approvals and version tracking. This SharePoint site was created by Sullivan and Beta-tested by all team members over the course of the past year. Although this work has been laborious, time-consuming, and challenging, the team has managed to create a SharePoint system that currently has the capacity and capability to manage and track document uploads, technical reviews, and final approvals with version control and automated communication via MS Outlook. To date, the team has successfully executed over 63 technical documents. Many of these technical documents



Assistant Manager of the QCIMD Tyler Wood explains the equipment used for testing tensile strength of the paper products used here at GPO.



Office Automation Secretary Tisha Jenkins keeps the lab functioning, well supplied, and well organized.

are 50 pages or more each in length, and contain complex data. This type of extensive technical writing project was strongly enabled by the team’s ability to telework during the pandemic. The “Herculean Project” is an excellent example of “How Telework Works” at the GPO. As a result of GPO’s new telework program, the T&TSB team members are now able to telework two days each week.

The T&TSB team

members respect and appreciate each other’s unique skills and talents. They are a highly-functioning team with big expectations of themselves and one another. The team is proud of the many different ways that they consistently contribute to the agency’s mission of *Keeping America Informed*, and they are particularly proud of their team’s ability to do this during a pandemic.